

REVIEW ARTICLE

Reflections on and insights from Australia's nursing workforce planning and forecasting

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ABSTRACT

Background and Objectives: This study aimed to analyze nursing planning in Australia and integrate it with the current situation of nursing planning in China to provide suggestions for the latter. **Method:** A literature review was conducted to examine nursing planning-related literature in both Chinese and English. **Results:** In 2014, Australia updated its nursing workforce planning on the basis of the HW2025 initiative and simulated various scenarios, such as comparative, demand restriction, skill mix, comprehensive, moderate self-sufficiency, productivity improvement, 65-year-old retirement age, and retire intention scenarios. These simulations projected the changes in supply and demand for registered nurses in 2025 and 2030, providing insights and references for nursing workforce planning in China. **Conclusion:** China's nursing planning should focus on nursing supply and demand and may draw on the scenario simulation method adopted by Australia.

Key words: nursing planning, supply and demand forecasting, scenario simulation

INTRODUCTION

The world is facing significant health challenges, including aging populations, a rising prevalence of chronic diseases, and an increasing burden of disease. Consequently, the demand for healthcare services is growing, which in turn poses challenges to the provision of healthcare. According to the Sixth Health Service Survey, by the end of 2018, individuals aged ≥ 60 years constituted 17.9% of China's total population. Further, this demographic is projected to account for 35.1% of the total population by 2050. In 2018, the prevalence of chronic diseases in this age group was 59.1%, with a significant occurrence of co-morbidities. Moreover, the number of individuals suffering from chronic diseases such as hypertension and diabetes is increasing rapidly, placing significant pressure on the existing healthcare service system. Registered nurses (RNs), representing the largest segment of China's healthcare workforce, are

unable to meet the growing demand for healthcare services. Consequently, it is crucial to forecast the future supply and demand of nursing staff on the basis of health trends and bridge the gap between the two in order to address healthcare challenges. This study systematically summarized Australia's nursing workforce planning and, by integrating it with China's mid-to-long-term nursing planning, aimed to provide insights for the future development of China's nursing workforce.

DATA SOURCES AND METHODS


A literature search on nursing planning in both Chinese and English was conducted, utilizing the China National Knowledge Infrastructure (CNKI) as the primary Chinese database and PubMed for English literature. The literature search focused on literature published from January 1990 to May 2022. Regarding the Chinese literature, "nursing planning" was employed as the principal search term. Regarding the English databases,

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the search was refined to titles containing both “Australia Nurse” OR “Australia Registered Nurse” OR “Australia Enrolled Nurse” and “Planning.” This comprehensive search yielded a total of 339 Chinese and 17 English articles. After excluding duplicates and articles unrelated to nursing planning, 32 pertinent documents were identified. This process facilitated a thorough understanding of the current situation and future planning of nursing in both China and Australia.

CURRENT STATUS OF AUSTRALIAN NURSING WORKFORCE PLANNING AND FORECASTING

Planning background

Australia, similarly to other developed nations, faces significant financial pressures in developing its healthcare workforce, exacerbated by an aging population and rising treatment costs due to technological advancements. Additionally, the proportion of healthcare service expenditure to GDP is increasing; in 2012, Australia's total health expenditure exceeded \$140 billion, accounting for 9.5% of its GDP. The Institute of Health and Welfare estimated that, between 1999 and 2010, healthcare spending grew at an average annual rate of 5%, outpacing the GDP growth rate of 3% in the same period. This trend of escalating healthcare expenditures is unsustainable over the long term. The healthcare workforce, with nurses constituting the largest group, is a significant part of the health budget. By 2019, registered nurses and midwives represented 55.2% of the healthcare workforce, with a growth rate of 3.17% since 2013. The Australian Ministry of Health published the “Health Workforce 2025 – Doctors, Nurses, and Midwives” report (HW2025) in 2012^[1] and updated it in 2014.^[2] The report highlighted the severe aging issue within Australia's nursing workforce and its low retention rates, particularly among newly enrolled and registered nurses, which emphasized the need for enhancing nursing workforce planning and rational staff allocation.

Planning method

Australia's nursing workforce planning encompasses two primary components: supply forecasting and demand forecasting. The stock-flow model is employed to estimate future labor supply, with periodic adjustments to the initial workforce data (stock) based on the entry and exit (flow) of personnel. This adjustment considers the turnover rates by age and sex, accounting for not only the influx of new graduates and immigrants but also the transition of individuals from one age group to the next. Four key factors are integral to this model: (1) workforce stock; (2) new graduates (both domestic and international); (3) immigrants (both permanent and temporary); and (4) workforce outflow (both permanent

and temporary departures). Demand forecasting is conducted by using the health service use approach, with a focus on developing modeling tools that consider several essential factors/parameters: (1) graduation rates and trends among nursing students; (2) the age structure of the current workforce; (3) working hours by age and sex; and (4) migration.

Supply and demand forecasting is predicated on the assumption that the current trends in workforce supply and service models will persist. However, the supply of healthcare services and service models may change; therefore, scenario simulations are utilized to depict a specific vision of future healthcare service provision. Scenarios are commonly employed to illustrate future workforce supply and demand trends, government decisions, strategies of the higher education/training sectors, and actions by employers. Potential quantitative changes encompass shifts in the economic environment, evolving care models, changing scopes of practice, technological advancements, ongoing enhancements in preventive healthcare measures, levels of workforce retention (including during the educational phase), or changes in workforce influx through training or immigration. This study considered eight scenarios:

(1) Comparative scenario: Assuming that the current trend persists, the nursing workforce is compared among a range of hypothetical conditions.

(2) Demand restriction scenario: The delivery of healthcare services hinges on government financing, which significantly influences individuals' ability to access such services, thereby impacting their demand. In addition to government revenue, the general economic conditions affect the capacity of individuals and families to support their healthcare needs. Predictions from relevant entities indicate that, over the next few decades, the economic growth rate (annual increase of 2.7%) will not reach the historical growth rate (3.3%). Consequently, a slowdown in economic development may adversely affect the demand for nurses.

(3) Skill mix scenario: Concentrating on emergency hospitals and geriatric care, which employ the largest numbers of employees, this scenario explores variations in the skill composition by adjusting the proportions of RNs, enrolled nurses (ENs), and assistant in nursing/personal care assistants (AIN/PCAs). One approach is to maintain the current proportions of RNs, ENs, and AIN/PCAs, adopting a skill mix of 75% RNs, 25% ENs, and 5% AIN/PCAs for acute hospitals. Another approach is to allow for adjustments to the skill mix due to training capacity limitations, leading to a decrease in RNs (from 82% to 71%), an increase in ENs (from 15% to 24%), and an increase in AIN/PCA (from 3% to 5%) in acute hospitals from 2012 to 2020.

(4) Comprehensive scenario: This scenario involves altering multiple parameters on the basis of assumptions that are developed through consultations with experts. The first assumption is that the future workforce demand will be limited because of slow economic growth, leading to a decrease in nursing workforce demand. The second assumption is a gradual reduction in the attrition rate of RN students. The third is an increase in the employment rates for domestic RNs and EN graduates. The fourth assumption is an improvement in the retention rates for early-career RNs (ages 20–29) and ENs < 60 years.

(5) Moderate self-sufficiency scenario: Australia, a country highly reliant on international inflows, is predicted to experience a 50% reduction in net international migration (both permanent and temporary migrants) by 2030, alongside a 50% decrease in the number of international students graduating in nursing.

(6) Productivity improvement scenario: This scenario is intended to forecast the impact of a 5% productivity growth rate on future workforce supply and demand.

(7) 65-year-old retirement age scenario: This scenario illustrates how the retirement of all nurses at 65 years of age affects the nursing workforce.

(8) Retirement intention scenario: Because of the economic environment, nurses are postponing retirement. However, if the economic environment improves, the retirement age might revert to earlier norms. This scenario focuses on the nursing staff nearing retirement age (50–75 years) and assumes that, from 2015, the retirement rate for those > 55 years of age will gradually return to the historical level or increase by 20%.

The parameters in different scenarios were input into the forecasting tool. The results indicated that, among all scenarios, the comprehensive scenario had the highest supply of nursing workforce and the smallest gap between supply and demand, with the percentage of gap (gap/demand) decreasing from 45% in 2012 to 12% in 2030 (Table 1).

Comparative analysis

In the comprehensive scenario, workforce forecasting for various nursing departments—including emergency care, geriatric care, critical care and emergency, mental health, and other nursing departments—significantly reduces the risk for nursing shortages.^[3] Based on the supply and demand forecasting results for each scenario, strategies are proposed to enhance nurse retention (by extending the practice duration of the current workforce and reducing turnover rates) and improve efficiency (focusing on service efficiency enhancements through

the utilization of nursing skills). These measures include the following: (1) enhancing nurses' management and leadership skills, with a focus on developing middle managers, who will be empowered to innovate, redesign processes, adopt efficiency-improving technologies, and determine appropriate workload and staffing levels according to actual conditions while being responsible for overseeing and improving workplace culture and patient outcomes; (2) strengthening early career preparation and workplace support to reduce turnover rates among newly hired nurses, including measures such as enhancing nursing education programs and outcomes, ensuring better alignment between employer expectations and educational outcomes, increasing employment opportunities for nursing graduates, and balancing the demands between nursing graduates and employers; and (3) creating a workplace environment that fully leverages all roles and meets the required skill mix.

Australian workforce planning starts with an analysis of the current situation, which involves a detailed examination of the quantity, structure, distribution, working hours, and duties of nursing staff. The main characteristics are as follows: (1) largest scale: nurses constitute the largest workforce in Australia, with nurses and midwives accounting for 55.17% of the workforce by the end of 2019; (2) significant aging: the distribution of nurses across age groups is relatively balanced, with those aged 25–34 years accounting for 30.5%, 35–44 years for 21.3%, 45–54 years for 23.2%, and 55 years for 24.8%; and (3) clear responsibilities: most nurses are employed in acute hospitals and geriatric nursing homes, working in 23 areas of practice, including critical illness nursing, mental health nursing, geriatric nursing, emergency care, perioperative nursing, maternity care, and rehabilitation and disability nursing (excluding unspecified areas). Among them, 89.84% of nurses and midwives work as clinicians, typically as a part of a team that includes other nursing staff as well as related health and medical professionals. The team comprises nurse practitioners (NPs; belonging to the category of RNs, with a master's or equivalent education, providing advanced nursing services), RNs, ENs, and AIN/PCA. Within the team, various types of responsibilities and rights of nurses are clearly defined. These factors are considered in Australia's forecasting of nursing workforce demand.

CURRENT SITUATION OF NURSING WORKFORCE PLANNING IN CHINA

On April 29, 2022, the National Health Commission issued the “National Nursing Development Plan (2021–2025)” (Document No. [2022] 15), which summarized and analyzed the state of nursing care in China and the

Table 1: Supply and demand for nursing staff under different scenarios (individuals)

Scenario	2025			2030		
	Supply	Demand	Gap	Supply	Demand	Gap
Comparative scenario	273,522	358,879	-85,357	271,657	394,503	-122,846
Demand restriction scenario	273,522	339,492	-65,970	271,657	365,557	-93,900
Comprehensive scenario	300,398	339,492	-39,094	320,722	365,557	-44,835
Moderate self-sufficiency scenario	263,370	358,879	-95,509	251,744	394,503	-142,759
Productivity improvement scenario	273,522	352,400	-78,878	271,657	384,640	-112,983
Retirement intention scenario	267,693	358,124	-90,431	266,041	393,640	-127,599
65-year-old retirement age scenario	263,836	356,683	-92,847	262,579	392,108	-129,529

Note: Data source: Australia’s Future Health Workforce–Nurses Overview Report

achievements and problems of nursing care during the “13th Five-Year Plan.” It considered the national economic development planning, the “Healthy China 2030” planning requirements, and the direction of healthcare reform policies, to assess the situation facing nursing care during the “14th Five-Year Plan” period, and emphasized the opportunities and challenges amid the increasing aging of the population and insufficient supply of nursing services.

The plan pointed out that, by 2025, the total number of nurses in the country will reach an estimated 5.5 million, with 3.8 RNs per thousand individuals. The nursing workforce is expected to continue growing, with further optimization of its structure and significant improvements in quality and service capabilities to meet the economic, social, and healthcare development needs. The effective implementation of the responsibility system for holistic nursing will align nursing services more closely with the needs of the public and society. Further, the scope and breadth of nursing will be further enriched and expanded, with a significant increase in the provision of older adult nursing services, traditional Chinese medicine nursing services, community nursing services, and home nursing services. Subsequently, the level of scientific management in nursing will continue to improve, the quality of nursing services will be continuously enhanced, and mechanisms to motivate the nursing workforce will be further strengthened and perfected.

IMPLICATION OF AUSTRALIAN NURSING PLANNING FOR CHINESE NURSING WORKFORCE PLANNING

Planning should be dynamically adjusted

Health workforce planning is a dynamic process.^[4] Currently, several countries are facing the impacts of an aging population, chronic non-communicable diseases, COVID-19, and other infectious diseases. The continuous changes in the policy environment and the constant improvement in information technology create

new pressures and challenges in health workforce planning. Additionally, the balance between the supply and demand of the workforce is also changing dynamically. Even when a balance is evident, on a general scale, structural and regional imbalances may exist. Therefore, the ultimate goal of health workforce planning is to achieve the long-term objective of a balanced workforce development through the effective implementation of policies. This involves dynamically monitoring and evaluating the degree of supply and demand matching and making timely adjustments. The methods and approaches of workforce planning in Australia have significance for nursing workforce planning in China.

Clarifying the functional roles of nursing staff in China

In China, nurses have gradually become the largest workforce. In 2019, RNs constituted 34.4% of the healthcare workforce. Regarding responsibilities, most nurses engage in a variety of nursing tasks according to their specific professional titles and duties, such as life care and basic care.^[5] China’s “Nursing Regulations” specify the scope of responsibilities for RNs; however, unlike in developed countries, unified standards for nursing staff entry, professional qualifications, and the scope and content of work have not been established in China. Regarding cooperation models, in 2010, China launched the “Demonstration Projects for Quality Nursing Services,” with most hospitals adopting the grouped responsibility nursing work model.^[6] The core of this model lay in team collaboration, primarily involving RNs at different levels. However, at the systemic level, clear definitions were lacking for the responsibilities and authority of nurses at different levels, with most nurses undertaking similar tasks.^[7] Consequently, further clarification is required of the functional roles, responsibilities, and rights of nursing staff, and basic information collection and foundational research should be strengthened for nursing talent planning.

Conducting scenario simulation based on development trends

China can draw inspiration from Australia's scenario simulation approach. This involves considering changes in development trends and service models and conducting surveys and collecting data on the current status of the nursing workforce to simulate the quantity and composition demand, taking into account various strategic goals and issues. In addition to these strategies, the following measures should be taken to further improve the nursing workforce:

First, the current workforce requires strengthening. At this stage, China's economy has shifted from rapid growth to high-quality development, which places higher requirements on nurse staffing. China's current nursing workforce staffing levels are significantly behind the international average (8.28 nurses per thousand individuals in high-income countries, and 10.19 in OECD countries from 2018 to 2019), and the quality and capabilities are insufficient to meet the residents' increasing healthcare needs. In the future, the nursing staff shortage should be addressed and greater emphasis should be placed on capacity building. This requires continuously strengthening nursing education in institutions and gradually establishing a post-graduate education and training system centered on job competency. The integration and utilization of extant nursing staff should also be strengthened. Because of the particularity of frontline nursing work, older nurses may not adapt well to frontline duties and thus face reassignment issues, with many selecting relatively less demanding administrative departments such as medical records, general affairs, or supply departments.^[8,9] Therefore, it is crucial to promote stratified management of nurses, clarify the duties and tasks of nurses at all levels, adopt foreign policies and regulations pertinent to practicing nurses, fully leverage the solid professional skills and rich clinical experience of senior nurses, and clearly define the professional role of senior nurses.

Second, collaboration between nursing staff and other health professionals is required. As the largest workforce group in China, nurses play an important role in promoting and developing the Healthy China strategy. Teamwork should be strengthened to match skill mix with service demands and models. Similar to Australia, where nursing teams are composed of different types of RNs, China should enhance the skill mix model among public health personnel, practicing (assistant) physicians, RNs, and other health technicians. This involves building cross-level, cross-institutional, and cross-disciplinary teams to strengthen collaboration, improve talent efficiency, and further elevate the level of basic public healthcare services.

Strengthening the forecasting of nursing workforce supply

In China, regardless of whether it concerns national health workforce planning, regional health workforce planning, or specific health workforce team planning, the approach is often demand-oriented. Demand estimation is carried out using methods such as healthcare service demand methods, trend prediction methods, gray models, and population-to-staff ratio methods. These estimations predominantly predict staff shortages based on significant increases in healthcare service usage; however, they overlook predictions of existing staff supply. Upon further analysis, the lack of supply prediction was predominantly due to two reasons. First, effective communication and collaboration mechanisms were lacking between the healthcare sector and the education sector. Enrollment in educational institutions (particularly for nursing programs) and the utilization of talents lack a coordinated and dynamic adjustment mechanism, resulting in structural imbalances between the supply and demand of nursing talents, with a prominent issue being that the training scale and structure fails to align with the population's healthcare needs and the country's socioeconomic development needs.^[11] Second, from enrollment in nursing programs to entering the workforce, students undergo many entry processes, and a lack of analysis is evident on the attrition of nursing students at various stages. According to Shao *et al.*, the number of nursing staff enrolled in Beijing increased annually from 2015 to 2019.^[12] In 2015, 1585 nursing students were enrolled (graduating in 2019). According to the nurse license examination pass rates of some educational institutions,^[13,14] the nurse license examination pass rate in Beijing in 2019 was 90%, and all nurses passing the license examination entered healthcare institutions. In 2019, Beijing had 1426 nurses entering the workforce. Considering the increase in the number of RNs in Beijing from 2018 to 2019 (an increase of 7540 nurses), it is evident that Beijing needed to attract approximately 6000 RNs from other regions, indicating that the supply of RNs in Beijing was significantly below the demand. According to a previous survey, the attrition rate of RNs in 2019 was 3.3%. If the workforce demand is forecasted while neglecting to forecast the quantity, source, and mobility of workforce supply, it negates the purpose of workforce planning. This negligence will lead to the formulation of future regulatory policies that only stimulate demand and are unable to achieve macro-management and control of the enrollment numbers of nursing programs in different regions. Therefore, the next step should be to strengthen the establishment of a supply-demand balance mechanism and conduct dynamic monitoring to guide supply based on actual demand.

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Author contributions

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Conflicts of interest

There is no conflict of interest among the authors.

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